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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/502,126	02/10/2000	HARI PONNEKANTI	AMAT/3984/PDD/LOW K/JW	4779
32588	7590	06/23/2004	EXAMINER	
APPLIED MATERIALS, INC. 2881 SCOTT BLVD. M/S 2061 SANTA CLARA, CA 95050			MOORE, KARLA A	
			ART UNIT	PAPER NUMBER

1763

DATE MAILED: 06/23/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No. 09/502,126	Applicant(s) PONNEKANTI ET AL.	
	Examiner Karla Moore	Art Unit 1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 April 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 2-8,10,11 and 13-74 is/are pending in the application.
- 4a) Of the above claim(s) 23-61 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 2-8,10,11,13-22 and 62-74 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 23 May 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 2-4, 10-11, 13-16, 20, 22 and 62-67 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 5,769,952 to Komino in view of U.S. Patent No. 5,672,239 to Deornellas and U.S. Patent No. 5,858,108 to Hwang.
3. Komino discloses an apparatus for processing substrates, the apparatus comprising: a high pressure processing module (120) including a first plurality of substrate processing chambers (18 A-C), a first transfer chamber (20) that enables access to each of the first plurality of substrate processing chambers, and a first substrate handling member (22) disposed in the first transfer chamber and configured to transfer substrates into and out of any of said first plurality of substrate processing chambers, wherein at least one of the chambers is capable of being used as a liquid precursor deposition chamber; a low pressure processing module (100) including a second plurality of substrate processing chambers (10 A-C), a second transfer chamber (14) that enables access to each of the second plurality of substrate processing chambers, and a second substrate handling member (16) disposed in the second transfer chamber and configured to transfer substrates into and of any of said second plurality of substrate processing chambers; wherein said second plurality of substrate processing chambers includes at least one chemical vapor deposition chamber (column 5, rows 48-51); and a transfer area (130A and 130B) that enables substrates to be transferred between the high pressure processing module and the low pressure processing module.
4. Komino discloses the invention substantially as claimed and as described above.

Art Unit: 1763

5. However, Komino fails to teach the high pressure processing module as staged and also comprising one or more substrate stripping chambers.

6. DeOrnellas teaches the use of a staged processing module comprising both high pressure (wet rinsing) and low pressure stages (etching and stripping) for the purpose of allowing a substrate to undergo processing in a single system (column 2, rows 5-30).

7. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided a staged high pressure processing module in Komino in order to allow a substrate to undergo processing in a single system as taught by DeOrnellas.

8. Komino and DeOrnellas disclose the invention substantially as claimed and as described above.

9. However, Komino and DeOrnellas fails to disclose a loadlock chamber operatively coupled to the low pressure-processing module to enable transfer of substrates between the apparatus and a clean room (claim 64) or a loadlock chamber operatively coupled to the high-pressure module to enable transfer of substrates between the apparatus and a clean room (claim 66).

10. Hwang teaches the use of a loadlock chamber as a buffer chamber between a processing environment and the atmosphere for the purpose of removing dust particles from the substrate (abstract and column 1, rows 54-61) prior to entry into the processing environment.

11. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided a loadlock chamber coupled to a low pressure processing module or high pressure processing module in Komino and DeOrnellas in order to use the loadlock as a buffer chamber for removing dust prior to the entry of a substrate into a processing environment as taught by Hwang.

12. With respect to claim 2, Komino further discloses that the transfer areas may be used for heating and/or cooling (column 7, rows 18-20) and that the areas may house a plurality of treatment objects, if desired (column 11, rows 38-48).

13. With respect to claims 3-4 and 15-16, the transfer area (column 7, rows 10-18) and each of the second plurality of chambers (column 5, rows 14-22 and column 8, rows 57-61) are in fluid communication with a vacuum pump. Examiner notes that while Komino does not explicitly mention the

Art Unit: 1763

vacuum pump, it is made clear that each of these area are capable of being held at a vacuum and therefore they must be fluidly connected to a vacuum pump.

14. With respect to claim 10, the high pressure-processing module may comprise at least one substrate stripping/cleaning module (column 6, rows 10-14).

15. With respect to claim 11, the transfer area comprises a loadlock chamber (130A and 130B; column 6, rows 61-64).

16. With respect to the recitation that at least one of the processing chambers is dedicated to performing a liquid deposition process (claim 64). Komino teaches that each of the chambers (18A and 18C) is designed to dispense a liquid into the high pressure chamber and therefore would be capable of being used as a deposition chamber. Komino also notes that each of the chambers is not limited to the treatments explicitly described and that alternative constructions are possible according to the types of treatment required before or after low pressure treatment (see column 6, rows 7-35).

17. With respect to claims 13 and 20 which include limitations primarily directed towards intended uses of the high pressure processing chambers (spinning, curing, stripping and silylation), the high pressure chambers of Komino are taught as being used for and/or capable of spinning, curing, stripping or deposition. Recitations of a deposition chamber specifically for silylation and a stripping chamber specifically for oxidation are viewed as an intended uses of the chambers, which contain no structural distinctions over the prior art. Examiner also notes that each of the high pressure chambers is capable of supplying a gas (column 6, rows 36-42).

18. The courts have ruled that expressions relating the apparatus to contents thereof during an intended operation are of no significance in determining the patentability of the claim. *Ex parte Thibault*, 164 USPQ 666, 667 (Bd. App. 1969).

19. With respect to claims 14, 22 and 66-67, as noted above the two loadlock transfer chambers between the high pressure and low pressure processing modules may be configured as multi-slot pre-heating and/or cooling chambers.

20. With respect to claims 62 and 63, an isolated processing region of each of said second plurality of chambers (using gate valves 12 A-C) and an interior region of said high pressure deposition module

Art Unit: 1763

(using an inert gas, column 6, rows 39-42) are isolatable from an exterior environment in which said apparatus is situated.

21. With respect to claim 65, as noted above, at least one of the high pressure chambers is capable of deposition. Further, Komino teaches that spinning may be used during treatment (column 6, rows 21-22).

22. Claims 5-6 and 17-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Komino in view of DeOrnellas and Hwang as applied to claims 2-4, 10-11, 13-16, 20, 22 and 62-67 above, and further in view of U.S. Patent to No. 6,214,620 to Kim.

23. Komino, DeOrnellas and Hwang disclose the invention substantially as claimed and as described above.

24. However, Komino, DeOrnellas and Hwang fail to teach each of the second plurality of processing chambers has two isolated processing regions and each isolated processing region includes a gas distribution assembly disposed therein and each gas distribution assembly shares process gases from one or more gas sources.

25. Kim discloses a processing chamber (Figure 2) comprising two processing regions, each region includes a gas distribution assembly (not numbered) and each gas distribution assembly sharing process gases from one or more sources for the purpose of configuring a machine with a small footprint and increased throughput, as compared to a single region system (column 1, rows 50-60).

26. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided an apparatus with two processing regions with a gas distribution assembly in each region and each sharing process gases from one or more sources in Komino, DeOrnellas and Hwang in order to configure a machine with a small footprint and increased throughput as taught by Kim.

Art Unit: 1763

27. Claims 7-8 and 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Komino in view of DeOrnellas, Hwang and Kim as applied to claims 5-6 and 17-18 above, and further in view of U.S. Patent No. 5,587,038 to Cecchi et al.

28. Komino, DeOrnellas, Hwang and Kim disclose the invention substantially as claimed and as described above.

29. Komino, DeOrnellas, Hwang and Kim fail to teach a remote plasma system having an RF generator connected to each individual processing region.

30. Cecchi et al. teach the use of a remote plasma system in a processing chamber having an RF generator, wherein the remote plasma system is connected to and in fluid communication with the processing region because plasma generation is useful in a variety of fabrication processes (column 1, rows 14-16) and located remotely for the purpose of allowing the aspect ratio of the processing chamber to be increased and improving processing conditions, such as pumping speed, reaction product exhaust, control of wall chemistry and the like (column 4, rows 7-21).

31. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided a remote plasma system connected to and in fluid communication with each processing chamber in Komino, DeOrnellas, Hwang and Kim due to its usefulness in a variety of fabrication processes and to have the system located remotely in order to allow optimization of aspect ratio and other process conditions as taught by Cecchi et al.

32. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Komino in view of DeOrnellas and Hwang as applied to claims 2-4, 10-11, 13-16, 20, 22 and 62-67 above, and further in view of U.S. Patent No. 5,587,038 to Cecchi et al.

33. Komino, DeOrnellas and Hwang disclose the invention substantially as claimed and as described above.

34. However, Komino, DeOrnellas and Hwang fail to teach a remote plasma system having an RF generator connected to an individual processing region.

Art Unit: 1763

35. Cecchi et al. teach the use of a remote plasma system in a processing chamber having an RF generator, wherein the remote plasma system is connected to and in fluid communication with the processing region because plasma generation is useful in a variety of fabrication processes (column 1, rows 14-16) and located remotely for the purpose of allowing the aspect ratio of the processing chamber to be increased and improving processing conditions, such as pumping speed, reaction product exhaust, control of wall chemistry and the like (column 4, rows 7-21).

36. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided a remote plasma system connected to and in fluid communication with a processing chamber in Komino, DeOrnellas and Hwang due to its usefulness in a variety of fabrication processes and to have the system located remotely in order to allow optimization of aspect ratio and other process conditions as taught by Cecchi et al.

37. Claims 68-72 rejected under 35 U.S.C. 103(a) as being unpatentable over Komino in view of DeOrnellas and Hwang as applied to claims 2-4, 10-11, 13-16, 20, 22 and 62-67 above, and further in view of Japanese Patent No. 11-087467 A to Saeki and U.S. Patent No. 6,318,945 to Hofmeister.

38. Komino, DeOrnellas and Hwang disclose the invention substantially as claimed and as described above.

39. However, Komino, DeOrnellas and Hwang fail to disclose a multi-slot substrate preheating module/loadlock with vertically isolatable and movable compartments.

40. Saeki discloses a multi-slot loadlock chamber comprising: a housing (31) including an opening (31A); a first compartment (33), the first compartment being operatively coupled to a first moveable shaft (33E); and a substrate transfer region (between 33 and 32) where substrates can be transferred into or out of the first compartment of the module through the opening in the housing; wherein the first compartment is moveable within the housing to expose an interior section of the compartment to the opening.

Art Unit: 1763

41. Regarding claim 69, the compartment is moveable between a substrate loading /unloading position that exposes the interior section of the first compartment to the opening and an isolation position where the compartment is isolated from the atmosphere in the substrate transfer region.

42. With respect to claim 70, the module further comprises first (31F) and second (31E) sealing flanges disposed peripherally within and extending inward from the housing and wherein the first compartment comprises a bottom platform (33C), a top platform (31D) and wherein when the first compartment is in the isolation position the top platform engages the first sealing flange and the bottom flange engages the second sealing flange.

43. With respect to claim 71, a second compartment (32), the second compartment being operatively coupled to a second moveable shaft (32E) so that it is moveable within the housing to expose an interior section of the compartment to the opening.

44. With respect to claim 72, the second compartment is movable similar to the first compartment between the opening and an isolation region.

45. With respect to claim 73, the module comprises first and second flanges as described above as well as, third (31D) and fourth (31C) sealing flanges disposed peripherally within and extending inward from the housing; wherein the first compartment comprises a first bottom platform and a first top platform and wherein when the first compartment is in the isolation position the first top platform engages the first sealing flange and the first bottom platform engages the second sealing flange; and wherein the second compartment comprises a second bottom platform (32H) and a second top platform (32D) and wherein when the second compartment is in the isolation position the second top platform engages the third sealing flange and the second bottom platform engages the fourth sealing flange.

46. With respect to claim 74, when each of the first and second compartments are positioned in the isolation position, the compartments are spaced apart from each other in a vertical relationship and the transfer region is located between the compartments.

47. The module of Saeki is constructed as described above for the purpose of reducing the footprint of the module and as a result raising the flexibility of the layout of a processing room (effect of the invention paragraph 37, see translation of provided by JPO website).

Art Unit: 1763

48. It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided a loadlock as described above in Komino, DeOrnellas and Hwang in order to reduce the footprint of the module and as a result raising the flexibility of the layout of a processing room as taught by Saeki et al.

49. Komino, DeOrnellas, Hwang and Saeki fail to teach supports for each of the compartments that support the platforms in a spaced relationship or for any other purpose.

50. Hofmeister et al. teach the use of supports (58 and 68) in a vertical multi-chamber loadlock for the purpose of supporting individual substrates in a spaced configuration (column 3, row 67 through column 4, rows 1). The supports would also necessarily maintain the platforms in a spaced relationship.

It would have been obvious to one of ordinary skill in the art at the time the Applicant's invention was made to have provided supports in each compartment of a loadlock chamber in Komino, DeOrnellas, Hwang and Saeki in order to support individual substrates in a spaced configuration as taught by Hofmeister.

Response to Arguments

51. Applicant's arguments filed 21 April 2004 have been fully considered but they are not persuasive.

52. In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

53. Examiner notes that motivation for the combination of Komino and DeOrnellas is found in DeOrnellas as pointed out in the above rejections. The motivation is found at column 2, rows 5-30 of the DeOrnellas patent.

Art Unit: 1763

54. As is well known in the art and clearly expressed in DeOrnellas and Komino, the inclusion of several different processing modules in a cluster tool allows for processing of a substrate without exposure to the external atmosphere. DeOrnellas goes a step further by disclosing a cluster tool that incorporates modules capable of processing a substrate at atmospheric pressure and modules capable of processing at vacuum pressure. This teaching is why the reference was cited and relied upon. Additionally, DeOrnellas teaches that one of the modules can be constructed to be capable of stripping a wafer, as claimed.

55. Examiner acknowledges that DeOrnellas does not explicitly disclose a deposition module or that the concept of combining modules at various pressures in a single cluster tool can be applied to deposition/addition modules. However, the basic concept of cluster tools is that several differing processes can be incorporated into one tool. One of ordinary skill in the art would recognize that the modules disclosed in DeOrnellas would be capable of performing different processes (such as deposition) and also that other chambers could be added and/or substituted (to carry out deposition). One of ordinary skill in the art would not conclude that the advantages were only applicable to the specific processes mentioned in the specification of DeOrnellas. Examiner further notes that independent claim 66 does not recite a module capable of deposition. Therefore, Applicant's argument, regarding whether or not DeOrnellas specifically discloses a deposition chamber as part of the cluster tool, is immaterial with respect to this claim.

56. With respect to Applicant's argument that Komino fails to recognize the advantages of positioning a stripping chamber within a separate, staged, high pressure module as disclosed in Applicants claimed invention and DeOrnellas, Examiner points out that the reference is not relied upon for this teaching. DeOrnellas recognition is sufficient for rejection purposes. Examiner notes, in response to applicant's arguments against the references individually, that one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Art Unit: 1763

Conclusion

57. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Karla Moore whose telephone number is 571.272.1440. The examiner can normally be reached on Monday-Friday, 8:30am-5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on 571.272.1439. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

km
18 June 2004

P. Hassanzadeh
Parviz Hassanzadeh
Primary Examiner
Art Unit 1763